HAWAII COOPERATIVE EXTENSION SERVICE
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CARE FOR YOUR GARDEN--USE PLANTS SUITABLE FOR WINDBREAKS, GREEN MANURE, AND COVER CROPS

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Soil erosion may be a serious problem in the home garden. Soils need to be protected from the impact of raindrops, irrigation, and water runoff. Soils and crops also need protection from wind, which causes soil erosion and damages plants.

Plants Suitable for Windbreaks

Some plants grow faster than others. Plants may be tall, moderately tall, or short. They may be permanent or temporary. Generally, temporary windbreaks are preferred for protecting the home garden.

The best type of plant depends partly on the size of the garden; small gardens need small plants, and larger gardens need larger plants. Another factor is the type of crops grown; low-growing plants such as onions require smaller windbreaks, and taller plants such as tomatoes require taller and larger windbreaks. You will also need to consider the source of seed or planting material available in your area; choose only the plants for which you can obtain seed or planting materials. Local soil conditions are another consideration; choose plants that are adapted to your soil and local climate. Tables 1, 2, and 3 list trees, shrubs, and other plants that make good windbreaks in Hawaii.

Plants for windbreaks should grow faster and taller than the plants to be protected. They should be planted in time to provide the protection needed.

Windbreak plants require the same care as crop plants. They should be fertilized, irrigated as needed, kept weed free by cultivation, herbicides, or hand weeding, and protected from disease and insect attacks. They should also be protected from fire and mechanical damage. This will result in good windbreaks that provide proper protection for the garden.[1]

Green Manure and Cover Crops

Green manure and cover crops are close-growing legumes, grasses, or mixtures of legumes and grasses grown primarily for soil protection or soil improvement. Cover crops are grown in home gardens to protect the soil between plantings, and green manure crops are grown to add organic matter to improve the soil for the following crops.

To determine the optimum time for planting, seeding rate, days to maturity, habit of growth, and need for pounds of actual nitrogen per ton of dry material plowed down,[2] refer to Tables 4 and 5. Legumes should be inoculated with the correct strain of *Rhizobium* to insure that they will fix nitrogen from the air. If they are not inoculated they behave in the same way as nonlegumes. If the properly inoculated legume has been grown on the same area during the previous three years, inoculation is not needed.

Determine Seeding Rates on Percentage of Live Seed (PLS)

This will ensure a good competitive stand to suppress weed growth. PLS is the percentage of live seed in the package. This figure is obtained by multiplying the purity of the mixture by the percentage of seeds that germinate, and multiplying the result by 100. For example, if purity is 95 percent (as given on the package) and a germination test shows 90 percent, 0.95 x 0.9 x 100 = 85.5 PLS. If it is recommended that you plant 0.1 lb PLS/1000 sq ft, it will be necessary to plant 0.12 lb of the above mixture to obtain the proper stand of plants. If the PLS is unknown, increase the recommended PLS seeding rate by 15 to 25 percent. If legumes and nonlegumes are grown in combination, reduce the PLS seeding rate by 50 percent for the nonlegume and 25 percent for the legume.[3]

Where to Get Planting Materials for Windbreaks, Green Manure, and Cover Crops

Trees for windbreaks are available at local nurseries that produce plants for this purpose. In addition, the USDA Soil Conservation Service (SCS) produces some plants in its Plant Materials Development Center on Molokai. The State Forestry

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Table 1. Trees suitable for windbreaks

Plant common name	Mature height ft	Growth rate	Pests or disease	Becomes weed	Rainfall inches/yr	Poisonous
Bamboo	8–100*	Very fast		Yes	60+	No
Autograph tree	10–50+	Medium		No	20+	No
Sea grape	5–40+	Medium		No	10+	Yes
Hau	5–25	Rapid		Yes	10+	No
Common olive	25	Medium to rapid		No	20+	No
Tamarisk	5–30*	Very fast at sea level		No	20+	No

*The lower growing varieties are best suited for windbreaks in home gardens. Other trees, such as fruit trees and ornamental trees, can be used for windbreaks but are generally too large for the home garden.

Table 2. Shrubs and shrublike plants suitable for windbreaks

Plant common name	Mature height ft	Growth rate	Pests or disease	Becomes weed	Rainfall inches/yr	Poisonous
Beefsteak plant	3–15	Rapid	Insects	No	20+	No
Dwarf poinciana	6–15	Med. slow		No	20+	No
Croton	2–20	Slow		No	40+	No
Duranta	6–20	Rapid	Black scale	No	20+	No
Crape myrtle	To 25	Moderately slow	Beetles attracted	No	20+	No
Privet	To 15	Rapid		No	20+	No
Beach heliotrope	20	Moderately slow		No	20+	No
Mock orange	6–20	Moderately slow	Red spider	No	20+	No
Oleander	7–20	Rapid	Black scale & mealy bug	No	20+	Yes
Panax	6–20	Rapid		No	20+	No
Blue vitex	15–20	Rapid		No	20+	No

Table 3. Other plants suitable for temporary windbreaks

Plant common name	Mature height ft	Growth rate	Pests or disease	Becomes weed	Rainfall inches/yr	Poisonous
Corn	6–8	Rapid		No	20+	No
Sorghum	6–8	Rapid		No	20+	No
Sudan grass	6–8	Rapid		Yes	20+	No
Sunn hemp	4–6	Rapid		No	20+	No
Pigeon pea	2–12	Rapid		No	20+	No

Table 4. Legumes for green manure and cover crops[1]

Plant	Growth days	Habit	Seed rate lb PLS/1000 sq ft at planting	lb actual N/T dry matter[2] needed at plow down	Optimum planting period
Pigeon pea*	90	Perennial	.10-.14	0	Year-round
Alfalfa	60	Perennial	.05	0	Year-round
Sweet clover	90	Perennial	.05	0	Year-round
Cowpea	90	Annual	.14	0	Year-round
Sunn hemp*	60	Annual	.10-.14	0	Year-round at 0-1000 ft; spring & summer at 1000-2000 ft
Vetch (winter, purple, & common)	90	Annual	.10-.14	0	Year-round over 2000 ft; fall & winter below 2000 ft

[1]Other plants may be satisfactory as green manure and cover crops but generally are not recommended for home gardens.

[2]Amount of actual nitrogen needed for each ton of dry matter added to the soil when plowed down.

*Tall-growing plants should be mowed before plowing under. Other legumes may be used, but dense growth, twining growth, and high seed production cause greater difficultry in plowing under in the home garden.

Service has a tree nursery in Kamuela, Hawaii, and in Makiki Valley on Oahu.

Your local seed store, the Horticulture Department Seed Laboratory at the University of Hawaii-Manoa in Honolulu, and the USDA-SCS Plant Materials Development Center on Molokai can supply seed for green manure and cover crops. The proper *Rhizobium* culture for the legume seed may be obtained from your local seed store.

Where to Get Help

For assistance in establishing windbreaks or green manure and cover crops in your area, contact your county agricultural agent, the local USDA-SCS technician, or the state forester (for windbreaks only). They can help you obtain good quality seedlings and seed for these purposes and assist in the establishment and management of windbreaks and green manure and cover crops.

[1]For more information on windbreaks for the home garden, see General Home Garden Series No. 38, "Care for Your Garden--Use Windbreaks," and Cooperative Extension Circular 438, "Windbreaks for Hawaii."

[2]For discussion of nitrogen immobilization when non-legumes are plowed under, see General Home Garden Series Nos. 6 and 7.

[3]For additional information regarding management of green manure and cover crops, see General Home Garden Series No. 39.

Table 5. Nonlegumes for green manure and cover crops[1]

Plant	Growth days	Habit	Seed rate lb PLS/1000 sq ft at planting	lb actual N/T dry matter[2] needed at plow down	Optimum planting period
Barley	90	Annual	.16	20	Year-round over 2000 ft; fall & winter below 2000 ft
Buckwheat	30	Annual	.14	20	Year-round
Millet*	60	Annual	.06	20	Year-round to 2500 ft
Oats	90	Annual	.16	20	Year-round over 2000 ft; fall & winter below 2000 ft
Ryegrass	90	Annual	.05	25	Year-round over 2000 ft; fall & winter below 2000 ft
Sorghum*	60	Perennial	.06	25	Year-round to 2500 ft
Sudan grass*	60	Perennial	.06	13	Year-round to 2500 ft
Wheat	90	Annual	.16	16	Year-round over 2000 ft; fall & winter below 2000 ft

[1]Other plants may be satisfactory as green manure and cover crops but generally are not recommended for home gardens.

[2]Amount of actual nitrogen needed for each ton of dry matter added to the soil when plowed down.

*Plants taller than 2 ft are best mowed before plowing into the soil.